5   AUTONOMOUS MOBILE ELECTRONIC MAIL SYSTEM

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10   FIELD OF INVENTION

The invention relates generally to a system and method for mobile communication and more specifically to an electronic mail system.

BACKGROUND

15   Increasingly, industries rely on a fleet of dispatched mobile units to provide services or deliver products. For example, general contractors, utility providers, cable companies, appliance service providers, truck rental companies, taxi companies, airlines, police/fire departments, and various delivery services all utilize mobile units (e.g., vans, trucks, automobiles, airplanes) as part of their respective operations. When an operation involves numerous mobile units, it is

20   often desirable, yet difficult, to obtain information about the dispatched mobile units. For example, it is desirable to know if a mobile unit has been involved in an accident or if an employee driver is using the mobile unit in an inappropriate manner.

Locating a mobile unit is especially useful if it can be done from a remote management station, such as where the scheduling is done. This remote locating process usually entails two

25   steps: determination of the position of the mobile unit, and transmission of the positioning data or the position data to the remote management station. One of the methods for determining the location of a mobile unit utilizes the Global Positioning System (GPS). The GPS involves a plurality of satellites orbiting the earth and sending out, at synchronized times, a code sequence that identifies the satellite. Along with this identification information is sent some positioning

30   information that can be processed to determine a position. A GPS receiver receives the code sequence and the positioning information and passes it on to a processor. The processor determines the position of the GPS receiver by using well-known methods such as triangulation.

The position information as determined by the GPS receiver is then transmitted to a server that stores all the information. Typically, this transmission from the GPS receiver to the

35   server is achieved via a combination of wireless communication networks such as CDMA and

5   the Internet. FIG. 1, for example, discloses a centralized system 10 whereby a mobile unit 12

with a GPS receiver 14 transmits the positioning information to a remote server 16 via a CDMA

network 18. The server 16 stores all the position information in a database 20 and allows client

stations 22 to access the database 20 through the Internet 24. Further details of this system are

provided in U.S. Patent No. 5,959,577.

10   While the system of U.S. Patent No. 5,959,577 accomplishes the goal of allowing remote

management stations to obtain information about mobile units, it has several drawbacks that

make the system unappealing to clients. These drawbacks stem primarily from the fact that the

position data for all the mobile units 12 are centrally stored at the server 16. There is an inherent

lack of privacy associated with this shared-server system, and the possibility that Client A might

15 accidentally access location information pertaining to Client B's fleet may cause enough

discomfort on the part of some clients to stop the client from using the system. Furthermore,

consolidation of data for all the mobile units in one database poses a scalability problem as more

clients join the system, and results in a high maintenance fee. The increased maintenance fee

will inevitably get passed on to the clients. Also, if the database experiences a problem (e.g., it

20 crashes), all the clients whose operations depend on the central database will be affected. Lastly,

this centralized data control system prevents clients from being able to manipulate the data and

report format freely. Whichever format the server 16 uses for its reports, that is the format that is

"pushed out" to all the clients. Thus, a client who subscribes to the system of U.S. Patent No.

5,959,977 could pay a high monthly charge for a system that might not be convenient to use.

25   A system and method of providing position information to clients in a more cost effective

and convenient manner is desired.

SUMMARY

The invention is a system, a device, and a method that allows remote mobile unit

30 monitoring without the above-mentioned drawbacks. The communication system of the

invention includes a mobile unit having a processor, a memory, and a wireless modem for

automatically generating a status report once a condition is fulfilled, wherein the status report is

encapsulated in an electronic mail format. The communication system further includes a user

interface unit receiving the status report and displaying the status report according to a

5   predefined report format, wherein the user interface unit is geographically remote to the mobile
unit.

In another aspect, the invention is a mobile communication device that includes a
detection component for measuring a physical parameter, a processor connected to the detection
component, wherein the processor is for generating a status report incorporating the physical

10   parameter, a memory connected to the processor, wherein the memory is for storing the status
report, and a wireless modem connected to the processor, wherein the wireless modem is for
transmitting the status report according to a predetermined protocol once the physical parameter
fulfills a condition.

In another aspect, the invention is a method of communication, wherein the method

15   includes obtaining data, preparing a status report incorporating the data, and transmitting the
status report using one of SMTP, POP, IMAP, MIME, RFC-822, and Instant Messaging (IM)
protocols if the data satisfies a predefined condition, without receiving an external command to
transmit.

The invention is also a method of reconfiguring a remote unit using an electronic mail

20   protocol. The method entails encapsulating a command in an electronic mail format such that
the command is extractable by the remote unit and transmitting the command via an electronic
mail protocol.

In yet another aspect, the invention is a method of communication, wherein the method
includes means for obtaining physical data and positioning data; means for preparing a status

25   report using the physical data and the positioning data, and means for transmitting the status
report in an electronic mail without receiving an external command.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 depicts a centralized system for obtaining information about mobile units;

30   FIG. 2 depicts an automatic messaging system in accordance with the invention;

FIG. 3 depicts an automatic location messaging system in accordance with the invention;

FIG. 4 is a flowchart depicting an automatic e-mail generation process executed by the
mobile unit;

FIG. 5 is a flowchart depicting an alternative automatic e-mail generation process that is

35   executed by the mobile unit;

5   FIG. 6 is a flowchart depicting a remote reconfiguration process;

        FIG. 7 is a flowchart depicting a report displaying process that is executed by the stationary unit;

        FIG. 8 depicts an exemplary status report generated by the mobile unit;

        FIG. 9 depicts an exemplary multiple mobile unit report generated by the stationary unit;

10   and

        FIG. 10 depicts a graphical multiple mobile unit report generated by the stationary unit.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

        Embodiments of the invention are described herein in the context of vehicle-installed

15   devices and more specifically in the context of fleet management. However, it is to be understood that the embodiments provided herein are just preferred embodiments, and the scope of the invention is not limited to the applications or the embodiments disclosed herein.

        Unlike in the centralized system 10 of FIG. 1, where most of the storage and processing capabilities of the system reside in the server 16, the storage and processing capabilities of the

20   present invention reside in the individual mobile units. As a result of these capabilities residing in the mobile units, the system of the invention overcomes the above-mentioned drawbacks of the centralized system 10. In the system of the invention, the primary function of the stationary unit is to be an interface between the mobile units and the operator. Thus, the stationary unit receives status reports from the mobile units and displays the reports to the operator in a format

25   that is customized by the operator. The stationary unit of the system is easier to maintain than the server 16 of the centralized system 10 because there is no central database holding all the consolidated information at the stationary unit. Furthermore, even if the stationary unit experiences a problem (e.g., it crashes), there will be no significant effect on the operation of the overall system.

30   As used herein, "positioning information" is information that may be converted to useful position information with some processing. "Position information," on the other hand, is information that, without further processing, identifies a location. An "e-mail" or an "electronic mail," as used herein, refers to any form of communication using a well-known mail protocol, such as SMTP, POP, IMAP, MIME, RFC-822, IM, etc. The mobile unit 32 of the invention is

35   capable of sending status reports "automatically." An "automatic" e-mail generation refers to

5   creating an e-mail for transmission without receiving a Send command from a user. An

"external command," as used herein, is a command that was input from a separate unit (including

a person) than the recipient unit.

FIG. 2 is a schematic view of an automatic messaging system 30 in accordance with the

invention. The automatic messaging system 30 includes at least one mobile unit 32 that

10   communicates with at least one stationary unit 34. The communication between the mobile unit

32 and the stationary unit 34 entails e-mail exchanges via a network 36 and a wireless gateway

38. The mobile unit 32 automatically generates status reports addressed to the stationary unit 34,

as described below. The status report originating at the mobile unit 32 finds its way to the

stationary unit 34 via the wireless gateway 38 and the network 36, to which the stationary unit 34

15   is connected. As shown in FIG. 2, the mobile unit 32 may be implemented as a portable

handheld device (e.g., a cellular phone), a wearable device (e.g., a bracelet, a badge), or a device

installed in a vehicle.

The mobile unit 32 includes a wireless modem 40 for transmitting status reports and

receiving messages through the wireless gateway 38. In addition, the mobile unit 32 includes

20   various detection components 42 that are designed to measure various physical parameters such

as speed, air bag status, door status, ambient temperature, etc., a processor 44 that processes the

parameters measured by the detection components 42, and a memory 46 for storing the

parameters. The detection components 42 include various probes, sensors, and thermometers

connected to different parts of the vehicle, such as the speedometer, the rods, the latch at the

25   door, etc. A person of ordinary skill in the art will know which probes/sensors to use and how to

connect the probes/sensors to the processor 44 to implement the detection components 42. The

detection components 42 take measurements periodically, in response to a signal from the

processor 44.

The mobile unit 32 generates a status report, transmits a status report, or takes some other

30   predefined action when a condition is fulfilled. In a first embodiment, the condition is the

passage of a certain amount of time (Δt) since the last status report generation. In this

embodiment, if the mobile unit 32 is programmed to transmit a status report at a regular time

interval, the stationary unit 34 will receive a status report from the mobile unit 32 at a regular

time interval (e.g., every three minutes). If, on the other hand, the mobile unit 32 is programmed

5   to generate a status report every Δt but not transmit the status report unless a second condition is fulfilled, the mobile unit 32 will store the generated status report in memory 46.

In a second embodiment, the condition is the mobile unit 32 having traveled a predetermined minimum distance (Δd) since the last status report generation. In this embodiment, the mobile unit 32 regularly generates status reports and check what the travel

10   distance is since the last status report, so it can transmit the status report when the distance of Δd has been traveled.

In a third embodiment, the condition is a measured physical parameter having a certain relationship to a reference value. For example, the physical parameter may be "speed" and the reference value may be "> 80 mph." In this example, the processor 44 is programmed to

15   generate or send a status report upon receiving a signal from a detection component 42 indicating that the speed of the mobile unit 32 exceeds e.g., 80 mph. The reference value may be stored in the memory 46. The detection component 42 may sample the speed at a regular time interval but generate a status report only when the condition is fulfilled. Alternatively, the detection component 42 samples the speed at a regular time interval and the processor 44 generates a status

20   report each time a sample is taken. When the sampled speed exceeds the reference value, the sampling frequency may be automatically increased and status reports are generated more frequently. The generated status reports may remain stored in the memory 46 without being transmitted until another condition is fulfilled, such as if the high speed lasts for more than 10 consecutive samplings. In yet another embodiment, the processor 44 transmits every status

25   report that is generated but adds a special alert signal to the status report if a condition is fulfilled, such as if the detection component 42 that detects the air bag status indicates that the air bag has been deployed.

In addition to the sensor, the detection component 42 includes a connector for sending signals to the mobile unit components it is connected to. Since the detection component 42 is

30   connected to the processor 44 and is therefore able to receive signals from the processor 44, the processor 44 is able to actively change certain settings in the mobile unit components through the detection component 42.

The reference value(s) used in the third embodiment may be programmed in permanently or adjusted/provided by the stationary unit 34. The manner in which the stationary unit 34 uses

35   commands to set or adjust the parameter values is described below.

5   The memory 46 of the mobile unit 32 maintains a record of all the measured and calculated data for a predefined amount of time, e.g. a month. FIG. 8 below provides an exemplary table format that may be used to store the data. A user accesses the data at the stationary unit 34, either by sending an e-mail command and waiting for a responsive status report, or by receiving the automatic status reports. Optionally, the mobile unit 32 may include a

10   connection jack through which a user interface may be connected. If a user interface (e.g., a laptop computer) is connected to the mobile unit 32, the data in the memory 46 may be viewed, heard, downloaded, or otherwise accessed by a user through the connected user interface.

The stationary unit 34 includes a memory 62, a processing unit 64, and some type of user interface 66. The user interface 66 typically includes an output device such as a monitor (GUI)

15   and a speaker, combined with some type of well-known input device such as a keyboard or a mouse. The stationary unit 34 may include a backend processing unit 64 that performs limited processing functions such as report combination, command generation, and database management, as described below.

As will be described in more detail below, some embodiments of the automatic

20   messaging system 30 allow a two-way communication between the mobile unit 32 and the stationary unit 34. While the mobile unit 32 is capable of sending status reports automatically, the stationary unit 34 may generate and transmit e-mails in any way that best suits the need of the stationary unit 34. If desired, the stationary unit 34 may also be programmed to operate in an automatic mode. However, the stationary unit 34 may operate in a manual mode whereby status

25   reports are generated only in response to inputs from the operator. Alternatively, the stationary unit 34 may operate in a combination mode, generating manually requested e-mails as well as automatic e-mails.

While the messages generated by the mobile unit 32 contain status reports, the messages generated by the stationary unit 34 contain commands. The commands may be embedded in the

30   body of the message or in transmitted as an attachment. Commands may be used to trigger the recipient mobile unit to reconfigure its status reports, for example to include different data or change the timing of the status report generations and transmissions. If the stationary unit 34 sends a message with a command to "check ambient temperature," the processor 44, upon receiving the command, will parse the command and send a signal to the proper detection

35   components 42. Additionally, the command can be used to set or adjust reference values, such

5   as a reference speed value that triggers status report transmission. If the operator wants to be notified of mobile units moving at a speed greater than 70 mph instead of speed greater than 80 mph, s/he can send a command setting the reference speed to 70 mph.

Usually, a command is addressed to a specific mobile unit and triggers an action on the part of the target mobile unit. However, some embodiments allow the stationary unit to

10   "broadcast" a command to all mobile units in the system. Using the e-mail format, this broadcast function may be implemented by setting up a distribution group, addressing the command to multiple mobile units, or using the "copy" function.

FIG. 3 depicts an automatic location messaging system 70, which is substantially similar to the automatic messaging system 30 except that the mobile unit 32 includes a GPS receiver 48

15   for receiving positioning data from a GPS satellite system 74. The processor 44 uses the received positioning data to determine the position of the mobile unit 32. The position of the mobile unit 32 may be determined using any of the well known methods.

As in the automatic messaging system 30, the mobile unit 32 of the automatic location messaging system 70 may send status reports at a regular time interval (e.g., every three minutes)

20   or when a predefined condition is fulfilled. Since position information is available in the automatic location messaging system 70, position-based conditions can be used, unlike in the automatic messaging system 30. For example, an alert signal may be added to the status report if the mobile unit 32 goes out of an area that it should stay in (e.g., state border). Also, availability of the position information leads availability of various other parameters that may be derived

25   from the position information, such as an average speed and acceleration. While speed measurements taken by the detection component 42 measures the speed at the time of measurement, speed calculated from position data provides an estimated average speed. The average speed is determined by using the formula $(position_1 - position_2)/(time_1 - time_2)$. Once the average speed is calculated, acceleration may be calculated using the formula $(speed_1 -$

30   $speed_2)/(time_1 - time_2)$. Preferably, each status report is time-stamped. Thus, in the automatic location messaging system 70, conditions such as "an average speed greater than 80 mph" may be used to affect the manner of status report generation.

FIG. 3 shows a database 72 in the mobile unit 32 and the stationary unit 34. The database 72, which may be incorporated into the mobile unit 32, the stationary unit 34, or both, store what

35   is herein referred to as "peripheral data." Peripheral data includes any data that is independent of

5   a measurement by the detection component 42 or positioning data received by the receiver 48,

such as a map, speed limits, traffic light locations, and landmarks. As will be explained below,

the database 72 can be updated and edited. For example, if the driver of the mobile unit 32

notices a change in the speed limit or a landmark that should be added to the map database, the

mobile unit 32 may update the database 72 to reflect the change. The operator at the stationary

10   unit 34 may update the database 72 as well. If the database 72 is in the mobile unit 32, the

stationary unit 34 would update it by sending a command as described above.

FIG. 4 is a flowchart depicting an automatic e-mail generation process 90 executed by the

mobile unit 32, whereby a status report is transmitted at a regular time interval (Δt) or distance

interval (Δd). In addition, optionally, the e-mail may be generated manually, in response to a

15   command. The automatic e-mail generation process 90 begins with a data collection step 92.

The data collection step 92 includes collection of physical data by the detection components 42

(step 93) and/or collection of positioning data by the receiver 48 (step 94). If positioning data is

collected in step 94, the positioning data is used to derive the position of the mobile unit 32 (step

95). After the data collection step 92 but before the generation of a status report, the processor

20   44 checks to see if any command has been received to reconfigure the status report generation

(step 96). If such command has been received, the processor 44 checks to see if any new data

needs to be collected to comply with the new configuration (step 98). If new data is needed, the

new data is obtained by looping back to the data collection step 92. On the other hand, if either

there is no new configuration command or there is a configuration command but it does not

25   require more data collection, the status report is generated according to the configuration (step

100). As described above, some mobile units transmit every status report that is generated, while

other mobile units selectively transmit the generated status reports. If the status report is to be

transmitted (step 102), the mobile unit 32 transmits the status report (step 104) and also stores it

in the memory 46 (step 106). If this particular status report does not need to be transmitted, the

30   mobile unit 32 stores the status report without transmitting it. After waiting (step 108) for a

predefined time interval Δt, distance interval Δd, or a command, the automatic e-mail generation

process 90 is repeated.

The status reports may be generated in any well-known formats including but not limited

to human-readable format such as text and HTML and standard application formats such as

5 Microsoft Excel® or Outlook®. Optionally, for security purposes, the status reports may be encrypted prior to transmission using any of the known encryption methods.

  FIG. 5 is a flowchart depicting an alternative automatic e-mail generation process 110 that is executed by the mobile unit 32, whereby a status report is transmitted only if a predefined condition is fulfilled. The alternative automatic e-mail generation process 110 begins with the

10 detection component's obtaining of physical data (step 112) in response to a prompt by the processor 44. Using the physical data that is obtained, the mobile unit 32 checks to see if a predefined condition for transmitting position information is fulfilled (step 114). The predefined condition may be, for example, a measured speed that exceeds a reference value, such as 80 mph. If the condition is fulfilled, the processor 44 prompts the receiver 48 to collect positioning data

15 from the GPS satellites 74 (step 116) and derive the mobile unit position (step 118), for example by triangulation. The mobile unit position and the physical data are then incorporated into a status report, encapsulated in an e-mail, and transmitted to the stationary unit 34 (step 120). In the embodiment shown, the processor 44 checks the measured and calculated values against a list of emergency conditions and adds an emergency alert to the status report if any of the emergency

20 conditions are fulfilled. The list of emergency conditions, for example, may include a speed level that is considered to pose a serious danger (e.g., average speed >100 mph), or indicate a high likelihood of an accident, such as a deployed air bag, an abnormal acceleration pattern, or a position that is in an area marked as water. Thus, after determining the mobile unit position in step 118, at which point all the raw data for a status report has become available, the processor

25 44 checks to see if any of the emergency conditions are fulfilled (step 122). If any of the emergency conditions is fulfilled, an alert is added to the status report to make sure the operator is notified (step 124). If no emergency condition is fulfilled, no alert is added and the e-mail is transmitted without the alert. After a certain amount of time (step 126), the alternative automatic e-mail generation process 112 is repeated. The processes depicted in FIG. 4 and FIG. 5 may be

30 implemented in the form of any well-known computer-readable instructions or codes deemed suitable by a person skilled in the art.

  FIG. 6 is a flowchart depicting a remote reconfiguration process 130 that may be executed by the automatic messaging system 30 or the automatic location messaging system 70. As mentioned above, the mobile unit 32 includes detection components 42 that are controlled by

35 the processor 44. Since the processor 44 is capable of receiving commands from a remote

5 source, such as the stationary unit 34, the remote source is able reconfigure the mobile unit 32 by transmitting electronic mails containing commands.

In the remote reconfiguration process 130, the mobile unit 32 receives an electronic mail from the stationary unit 34 (step 132). The processor 44 authenticates the received electronic mail, for example by using a password or verification of electronic signature (step 134). Once

10 authentication is positive and complete, the processor 44 extracts the command in the electronic mail and interprets it (step 136). If the command includes a reconfiguration request, the processor 44 sends appropriate signals to one or more of the mobile unit components (step 138). For example, if the reconfiguration request is to change a speed reference value from 80 mph to 70 mph, the processor will send a command to the memory 46 to reset the reference value. If the

15 reconfiguration request is to change the door status to "lock" or to honk the horn three times, appropriate signals will be sent to the detection components 42 to execute the command. The detection components 42 not only detect physical parameters from various parts of the mobile unit 32 but also detect signals from processors and execute the signals through the mobile unit parts that they are connected to. Thus, the detection components 42 allow the stationary unit 34

20 to actively drive certain parts of the mobile unit 32 from a remote location, and to obtain information about specific mobile unit components from a remote location.

FIG. 7 is a flowchart depicting a report displaying process 140 that is executed by the stationary unit 34. When the stationary unit 34 receives an e-mail status report from at least one mobile unit 32 (step 142), it parses the e-mail and extracts the status report (step 144). The

25 stationary unit 34 also receives input from the operator (step 146). If the status report is encrypted, a decryption operation may be performed. Optionally, in embodiments where the stationary unit 34 includes the backend processing unit 64 described above, the reports received from multiple mobile units 32 may be combined to generate a comprehensive report. Thus, the processor 44 checks to see if the user input received in step 146 requests consolidation of the

30 multiple status reports (step 148). If the user input instructs to combine the reports, the stationary unit 34 combines the reports to generate a report that complies with the requested formatting parameters (step 150).

The system of the invention allows the operator at the stationary unit 34 to customize the report format. Thus, using the user interface 86, the operator is able to select the information she

35 is interested in receiving and a particular arrangement for the information. For example, the

5   operator may choose to see information regarding a particular mobile unit for the past week. Alternatively, the operator may want to see current information about all the mobile units in a particular geographical zone in the coverage area. Depending on the report format that is chosen by the operator, more data may need to get pulled, for example from the memory 46. For example, if not all the status reports from the mobile units are synchronized, status reports from

10   the mobile units will be received at different times. In this case, if the operator requests to see the status of multiple mobile units, the most recently received data for some of the mobile units will be pulled from the memory and combined with the status report that was just received at the beginning of the report displaying process 140. Furthermore, if the report format requested by the user requires any peripheral data, the appropriate peripheral data is pulled from the database

15   72 so they can be incorporated into the report. In step 150, the processor determines whether to pull data from the memory 46 and/or the database 72, and pulls the data as needed (step 154). Once all the necessary data is obtained and a report is prepared in the user-specified format, the report is presented to the operator through the user interface 66 (step 156).

       FIG. 8 depicts an exemplary status report 160 generated by the mobile unit 32 and e-

20   mailed to the stationary unit 34 to be viewed by the operator. The table-format report 160 includes a mobile unit identity 162, a current position 164, a current time 166, average speed 168, acceleration 170, a temperature 172, and air bag status 174. If the operator wishes to change the format of the report 160, for example by adding a column for door status, he will send an e-mail to the mobile unit 32 with a command to reconfigure the report accordingly. The

25   mobile unit 32, upon receiving this command to reconfigure the report, will obtain the door status measurement and prepare a new report, for example according to the automatic report generation process 90 (see FIG. 4).

       FIG. 9 depicts an exemplary multiple mobile unit report 180 generated by the stationary unit 34 in the step 150 of the report displaying process 140 (see FIG. 7). To generate the

30   multiple mobile unit report 180, the processor 44 in each of the multiple mobile units 32 sends its respective report to the stationary unit 34, which then combines the report content into one report and formats it according to user specifications, as shown in FIG. 7. The formatting process may entail pulling stored information, as described above in reference to FIG. 7.

       FIG. 10 depicts a graphical multiple mobile unit report 190 generated by the stationary

35   unit 34, which shows the relevant mobile units superimposed on a map pulled from the database

5   72. The graphical report 190 shows Mobile Unit A, Mobile Unit B, and Mobile Unit C, as well as some of their destinations (D_A and D_C for Mobile Units A and C, respectively). The destination of Mobile Unit B may be not shown because it is located off the portion of the map that is shown. In the graphical report 190, Mobile Unit A is shown marked with a star (*) to indicate that it is moving abnormally slow. The operator viewing the report can then call the

10   customer at Mobile Unit A's destination to inform the customer that the delivery will be a little late due to unforeseen traffic conditions.

The mobile unit 32 and the stationary unit 34 may exchange e-mail messages not only to modify or enhance the status report and ultimately the report viewed by the user, but also to modify the content of the database 72. For example, landmarks may be added to reports, deleted

15   from the list of landmarks in the database 72, or otherwise modified through e-mail exchanges. Numerous embodiments are possible for modifying the database 72. In a first embodiment, the stationary unit 34 sends a command to the mobile unit 32 to add the mobile unit's current location to the list of landmarks in the database 72. In response, the mobile unit 32 may add its current location to the list of landmarks it maintains in the database 72, which in this case is

20   located in the mobile unit 32. The newly added landmark is now available to be incorporated into a future status report or to be used as a parameter for alert generation. After the addition is complete, the stationary unit 34 sends another command to disable the mobile unit's ability to add landmarks. This way, the database is controlled through the stationary unit 34 but maintained in each individual mobile unit 32.

25   In a second embodiment, the stationary unit 34 sends a specific landmark to the mobile unit 32 along with a command to add the attached landmark to the list of landmarks in the database 72 located in the mobile unit 32. The stationary unit 34 may use this command, for example, when it has received the specific landmarks from other mobile units and wants to keep all the mobile unit databases consistent.

30   A third embodiment for modifying the database 72 utilizes a user interface device at the mobile unit 32. As mentioned above, a user interface device may be connected to the mobile unit 32, for example through an electrical jack. When the user interface device is connected to the mobile unit 32, the driver of the mobile unit 32 may initiate modification of the landmark list in the database 72. If the database 72 is located in the mobile unit 32, a direct input through the

35   user interface device accomplishes the modification. If the database 72 is located at the

5   stationary unit 34, however, a status report would be manually generated to tell the stationary

unit 34 to modify the landmark list in a certain way. The status report may tell the stationary unit

34 to add a particular landmark to the database 72. Alternatively, the status report may tell the

stationary unit 34 to add the mobile unit's current position as a landmark. The user interface

device may be as complex as a laptop computer or as simple as a button. A person of ordinary

10   skill in the art will understand how to implement this database modification feature.

Using the automatic messaging system 30, a stationary unit 34 can obtain information

about its mobile units 32, such as when a driver of the mobile unit is speeding or if the mobile

unit 32 is involved in an accident. Furthermore, if there is an unsafe condition that the driver of

the mobile unit 32 may not be aware of, such as a door that is not closed properly or a seatbelt

15   that is not used, the operator at the stationary unit 34 will be able to contact the mobile unit 32 to

tell the driver to properly close the door or use the seatbelt. In addition, the automatic messaging

system 30 may be used by the stationary unit 44 to receive periodic updates on the status of its

mobile units in a cost-effective manner.

The invention has been described using variations and examples to enable one skilled in

20   the art to develop an understanding of the invention. Numerous variations may be implemented

within the spirit and scope of the invention. For example, the stationary unit 34 may not be

literally "stationary." A positioning method other than the GPS satellite method may be used.

The memory 46 and the database 72 may be implemented as one storage unit. As such, one

skilled in the art should reference the claims of the invention rather than the foregoing examples

25   to assess rights entitled to with respect to the claims.